

CLAIMS

1. A system for web inspection of a web, the system comprising:
 - 2 a plurality of smart cameras, each smart camera for detecting a plurality
of web flaws from a streaming video signal, each smart camera
 - 4 having means for generating flaw image data and flaw location
data;
 - 6 a host computer for controlling the low contrast web inspection system
and for accepting and displaying the flaw image data and the flaw
 - 8 location data; and
 - 10 an ethernet for connecting the plurality of smart cameras to the host
computer.
2. The system of claim 1, wherein each smart camera of the plurality of smart
2 cameras comprises:
 - 4 a line scan camera for generating a pixel representation of a portion of
the web;
 - 6 a lighting uniformity and pixel sensitivity correction means for correcting
each pixel of the pixel representation and for providing a corrected
pixel representation;
 - 8 a web edge detector for detecting at least one edge of the web;
 - 10 a multi-pipeline pre-processor for filtering the corrected pixel
representation, the multi-pipeline preprocessor generating a
prioritized data stream of potential flaws;
 - 12 a run length encoder for generating location data regarding a location of
each group of the potential flaws in a cross direction;
 - 14 a blob detector for generating block data regarding the location of blocks
of the potential flaws along a machine direction; and
 - 16 an inspect/reject analyzer for determining actual flaw data from the
prioritized data stream of potential flaws.

3. The system of claim 2, wherein the multi-pipeline processor comprises:
- 2 a plurality of filters for averaging the corrected pixel representation over
 a distance of the web along a machine direction of the web;
- 4 a plurality of adaptive background subtraction channels connected to the
 plurality of filters;
- 6 a plurality of thresholders, each thresholder of the plurality of thresholders
 connected to an output of an adaptive background subtraction
8 channel of the plurality of adaptive background subtraction
 channels, each thresholder for grouping a subtracted pixel
10 representations; and
 a priority logic circuit for prioritizing the outputs of each of the plurality of
12 thresholders.
4. The system of claim 3, wherein the plurality of filters comprises:
- 2 a background filter;
- a machine direction streak filter;
- 4 a cross direction streak filter; and
 a small flaw filter.
5. The system of claim 3, wherein the plurality of thresholders comprises:
- 2 a single pixel flaw detector;
- a uniformity detector;
- 4 a machine direction streak detector;
- a cross direction streak detector; and
6 a small flaw detector.

2 6. The system of claim 1, wherein each smart camera of the plurality of smart cameras detects the plurality of web flaws from the streaming video signal at a contrast approaching a signal noise level.

2 7. A method for low contrast web inspection of a web, the method comprising the steps of:

4 providing at least on smart camera for inspecting at least a portion of the web;

generating flaw image data and flaw location data;

6 transmitting the flaw image data and flaw location data over an ethernet;

displaying the flaw image data and flaw location data.

2 8. The method of claim 7, wherein the step of generating flaw image data and flaw location data comprises the steps of:

generating a pixel representation of a portion of the web;

4 correcting the pixel representation for a lighting uniformity and a pixel sensitivity;

6 filtering the corrected pixel representation utilizing a plurality of filters;

8 grouping the filtered corrected pixel representations to generate a plurality of potential flaw data streams;

10 generating a prioritized data stream from the plurality of potential flaw data streams;

12 generating cross direction location data regarding a location of the prioritized data stream;

14 generating block data regarding the location of blocks of the prioritized data stream along a machine direction; and

16 determining actual flaw data from the prioritized data stream of potential flaws utilizing the cross direction location data and the block data.

9. A method for generating a prioritized image data stream from a digitized
2 video stream of a web, the method comprising the steps:
- 4 averaging the digitized video stream over a distance of the web to
 generate an averaged background signal;
 - 6 averaging the digitized video stream over a distance of the web along a
 machine direction of the web to generate a filtered machine
 direction signal ;
 - 8 averaging the digitized video stream over a distance of the web along a
 cross direction of the web to generate a filtered cross direction
10 signal;
 - 12 subtracting the averaged background signal from the filtered machine
 direction signal to generate a first pixel representation;
 - 14 subtracting the averaged background signal from the filtered cross
 direction signal to generate a second pixel representation;
 - 16 grouping the first and second pixel representations to generate at least
 two data streams of potential flaws; and
 - 18 prioritizing the at least two data streams of potential flaws to generate the
 prioritized image data stream.